

CLAIM AMENDMENTS

1 1. (Currently Amended) A computer-implemented method of allocating storage to a host
2 processor, comprising:
3 a control processor receiving a request to allocate storage to the host processor; and
4 the control processor associating one or more logical units from among one or more
5 storage units to the host processor by:
6 the control processor configuring a gateway device to map the one or more
7 logical units to the host processor;
8 the control processor configuring the one or more storage units to give the host
9 processor access to the one or more logical units; and
10 wherein the host processor does not determine which one or more logical units are
11 associated with the host processor.
12 ~~wherein the control processor is separate from the gateway device, the host~~
13 ~~processor, and the one or more storage units; and~~
14 ~~wherein the gateway device is separate from the control processor, the host~~
15 ~~processor, and the one or more storage units.~~

1 2. (Currently Amended) A method as recited in Claim 1, wherein:
2 ~~the configuring steps~~ the control processor configuring the gateway device and the
3 control processor configuring the one or more storage units are performed by
4 the control processor without modification to an operating system of the host
5 processor;
6 the gateway device is included in a virtual storage layer;
7 the host processor and the one or more storage units are included in a virtual server
8 farm;
9 ~~the control processor configures the gateway device to map the one or more logical~~
10 ~~units to a boot port of the host processor;~~
11 the control processor is coupled through one or more storage networks to a plurality of
12 storage gateways that includes the gateway device; and

13 the plurality of storage gateways are coupled through the storage networks to the one
14 or more storage units.

1 3.-6. (Cancelled)

1 7. (Currently Amended) A method as recited in Claim 1, further comprising:
2 the control processor causing the storage of first information that associates host
3 processors to logical units;
4 the control processor causing the storage of second information that associates logical
5 units to storage units;[[:]] and
6 the control processor associating step the one or more logical units from among the
7 one or storage units to the host processor further comprises the control
8 processor mapping the one or more logical units from among the one or more
9 storage units to a boot port of the host processor by reconfiguring the gateway
10 device to logically couple the one or more logical units to the boot port based
11 on the stored first information and the stored second information;
12 the control processor identifying one or more logical unit numbers (LUNs)
13 corresponding to the one or more logical units;
14 the control processor instructing the gateway device to map the one or more LUNs to
15 the small computer system interface (SCSI) port zero of the host processor
16 based on a unique processor identifier; and
17 the control processor instructing the one or more storage units to give the host
18 processor having the unique host identifier access to the one or more LUNs.

1 8. (Currently Amended) A method as recited in Claim 1, wherein the request to allocate
2 storage to the host processor is a first request to allocate storage to the host processor,
3 and the method further comprising comprises:
4 based on the first request, the control processor generating the a second request to
5 allocate storage to the host processor;
6 wherein the control processor is communicatively coupled to a control database;

7 wherein the second request is directed from the control processor to a storage
8 manager; and
9 wherein the storage manager is communicatively coupled to the control processor, the
10 control database, and a storage network that includes the gateway device; and
11 the method further comprises the control processor causing the storage manager to
12 issue instructions to the one or more storage units to give the host processor
13 access to the one or more logical units.

1 9. (Cancelled)

1 10. (Currently Amended) A method as recited in Claim 1, wherein the request to allocate
2 storage specifies a first amount of storage, and wherein the control processor
3 associating step the one or more logical units further comprises:
4 the control processor identifying the one or more logical units (LUNs) of the one or
5 more storage units that, when combined, have a ~~sufficient~~ second amount of
6 storage ~~to satisfy~~ that is at least as great as the first amount of storage specified
7 in the request[[:]].
8 ~~the control processor instructing the gateway device to map the identified LUNs to the~~
9 ~~small computer system interface (SCSI) port zero of the host processor based~~
10 ~~on a unique processor identifier; and~~
11 ~~the control processor instructing the one or more storage units to give the host~~
12 ~~processor having the unique host identifier access to the identified LUNs.~~

1 11. (Currently Amended) A method as recited in Claim 1, wherein the request is a first
2 request, and the control processor associating step the one or more logical units further
3 comprises:
4 the control processor issuing a second request to allocate one or more volumes on one
5 of the one or more storage units;
6 the control processor issuing a third request to make a concatenated volume using the
7 one or more allocated volumes;
8 the control processor causing the concatenated volume to be configured for use with
9 the host processor;
10 the control processor issuing first instructions to the one or more storage units to bind
11 the host processor to the concatenated volume by giving the host processor
12 access to the concatenated volume;
13 the control processor issuing second instructions to the gateway device to bind the
14 concatenated volume to the host processor.

1 12. (Previously Presented) A method as recited in Claim 11, further comprising:
2 the control processor determining that the second instructions have failed to bind the
3 concatenated volume to the host processor;
4 the control processor issuing third instructions to the one or more storage units to
5 un-bind the host processor from the concatenated volume;
6 the control processor determining that the first instructions have failed to bind the host
7 processor to the concatenated volume; and
8 the control processor issuing fourth instructions to the one or more storage units to
9 break the concatenated volume.

1 13. (Cancelled)

1 14. (Cancelled)

1 15. (Currently Amended) A method as recited in Claim 1, wherein:
2 the one or more logical units associated with the host processor include at least a first
3 logical unit from a first volume of a first storage unit of the one or more
4 storage units and at least a second logical unit from a second volume of a
5 second storage unit of the one or more storage units;
6 the request to allocate storage specifies a parameter selected from the group consisting
7 of an amount of storage to be allocated and a type of storage to be allocated;
8 the control processor is separate from the gateway device, the host processor, and the
9 one or more storage units; and
10 the gateway device is separate from the control processor, the host processor, and the
11 one or more storage units.

1 16.-39. (Cancelled)

1 40. (Currently Amended) A computer-readable medium for allocating storage to a host
2 processor, the computer-readable medium carrying one or more sequences of
3 instructions which, when executed by one or more processors, cause the one or more
4 processors to carry out the steps of:
5 the a control processor receiving a request to allocate storage to the host processor; and
6 the control processor associating one or more logical units from among one or more
7 storage units to the host processor by:
8 the control processor configuring a gateway device to map the one or more
9 logical units to the host processor:
10 the control processor configuring the one or more storage units to give the host
11 processor access to the one or more logical units; and
12 wherein the host processor does not determine which one or more logical units
13 are associated with the host processor.
14 ~~wherein the control processor is separate from the gateway device, the host~~
15 ~~processor, and the one or more storage units; and~~

16 ~~wherein the gateway device is separate from the control processor, the host~~
17 ~~processor, and the one or more storage units.~~

1 41. (Currently Amended) A computer-readable medium as recited in Claim 40, wherein:
2 ~~the configuring steps the control processor configuring the gateway device and the~~
3 ~~control processor configuring the one or more storage units~~ are performed by
4 the control processor without modification to an operating system of the host
5 processor;
6 the gateway device is included in a virtual storage layer;
7 the host processor and the one or more storage units are included in a virtual server
8 farm;
9 ~~the control processor configures the gateway device to map the one or more logical~~
10 ~~units to a boot port of the host processor;~~
11 the control processor is coupled through one or more storage networks to a plurality of
12 storage gateways that includes the gateway device; and
13 the plurality of storage gateways are coupled through the storage networks to the one
14 or more storage units.

1 42. (Currently Amended) A computer-readable medium as recited in Claim 40, further
2 comprising one or more sequences of instructions which, when executed by the control
3 one or more processors, cause the one or more processors to carry out the steps of:
4 the control processor causing the storage of first information that associates host
5 processors to logical units;
6 the control processor causing the storage of second information that associates logical
7 units to storage units; ~~and~~
8 the instructions for the control processor associating the one or more logical units from
9 among the one or storage units to the host processor further comprise one or
10 more sequences of instructions which, when executed by the one or more
11 processors, cause the one or more processors to carry out the step of the control
12 processor mapping the one or more logical units from among the one or more
13 storage units to a boot port of the host processor by reconfiguring the gateway

14 device to logically couple the one or more logical units to the boot port based
15 on the stored first information and the stored second information;
16 the control processor identifying one or more logical unit numbers (LUNs)
17 corresponding to the one or more logical units;
18 the control processor instructing the gateway device to map the one or more LUNs to
19 the small computer system interface (SCSI) port zero of the host processor
20 based on a unique processor identifier; and
21 the control processor instructing the one or more storage units to give the host
22 processor having the unique host identifier access to the one or more LUNs.

1 43. (Currently Amended) A computer-readable medium as recited in Claim 40, wherein
2 the request to allocate storage to the host processor is a first request to allocate storage
3 to the host processor, and the computer-readable medium further comprising
4 comprises one or more sequences of instructions which, when executed by the one or
5 more processors, cause the one or more processors to carry out the step of:
6 based on the first request, the control processor generating the a second request to
7 allocate storage to the host processor;
8 wherein the control processor is communicatively coupled to a control database;
9 wherein the second request is directed from the control processor to a storage
10 manager; ~~and~~
11 wherein the storage manager is communicatively coupled to the control processor, the
12 control database, and a storage network that includes the gateway device; and
13 the computer-readable medium further comprises one or more sequences of
14 instructions which, when executed by the one or more processors, cause the
15 one or more processors to carry out the step of the control processor causing
16 the storage manager to issue instructions to the one or more storage units to
17 give the host processor access to the one or more logical units.

1 44. (Cancelled)

1 45. (Currently Amended) A computer-readable medium as recited in Claim 40, wherein
2 the request to allocate storage specifies a first amount of storage, and wherein the one
3 or more sequences of instructions for the control processor associating the one or more
4 logical units further comprise one or more sequences of instructions which, when
5 executed by the one or more processors, cause the one or more processors to carry out
6 the steps of:

7 the control processor identifying the one or more logical units (LUNs) of the one or
8 more storage units that, when combined, have a sufficient second amount of
9 storage to satisfy that is at least as great as the first amount of storage specified
10 in the request [[:]].

11 ~~the control processor instructing the gateway device to map the identified LUNs to the~~
12 ~~small computer system interface (SCSI) port zero of the host processor based~~
13 ~~on a unique processor identifier; and~~

14 ~~the control processor instructing the one or more storage units to give the host~~
15 ~~processor having the unique host identifier access to the identified LUNs.~~

1 46. (Currently Amended) A computer-readable medium as recited in Claim 40, wherein
2 the request is a first request, and the instructions for the control processor associating
3 the one or more logical units further comprise one or more sequences of instructions
4 which, when executed by the one or more processors, cause the one or more
5 processors to carry out the steps of:

6 the control processor issuing a second request to allocate one or more volumes on one
7 of the one or more storage units;

8 the control processor issuing a third request to make a concatenated volume using the
9 one or more allocated volumes;

10 the control processor causing the concatenated volume to be configured for use with
11 the host processor;

12 the control processor issuing first instructions to the one or more storage units to bind
13 the host processor to the concatenated volume by giving the host processor
14 access to the concatenated volume;

15 the control processor issuing second instructions to the gateway device to bind the
16 concatenated volume to the host processor.

1 47. (Previously Presented) A computer-readable medium as recited in Claim 46, further
2 comprising one or more sequences of instructions which, when executed by the one or
3 more processors, cause the one or more processors to carry out the steps of:
4 the control processor determining that the second instructions have failed to bind the
5 concatenated volume to the host processor;
6 the control processor issuing third instructions to the one or more storage units to
7 un-bind the host processor from the concatenated volume;
8 the control processor determining that the first instructions have failed to bind the host
9 processor to the concatenated volume; and
10 the control processor issuing fourth instructions to the one or more storage units to
11 break the concatenated volume.

1 48. (Cancelled)

1 49. (Currently Amended) A computer-readable medium as recited in Claim 40, wherein:
2 the one or more logical units associated with the host processor include at least a first
3 logical unit from a first volume of a first storage unit of the one or more
4 storage units and at least a second logical unit from a second volume of a
5 second storage unit of the one or more storage units;
6 the request to allocate storage specifies a parameter selected from the group consisting
7 of an amount of storage to be allocated and a type of storage to be allocated;
8 the control processor is separate from the gateway device, the host processor, and the
9 one or more storage units; and
10 the gateway device is separate from the control processor, the host processor, and the
11 one or more storage units.

1 50. (Currently Amended) An apparatus for allocating storage to a host processor, the
2 apparatus comprising a control processor that is configured to carry out the steps of:
3 receiving a request to allocate storage to the host processor; and
4 associating one or more logical units from among one or more storage units to the host
5 processor by:
6 configuring a gateway device to map the one or more logical units to the host
7 processor:
8 configuring the one or more storage units to give the host processor access to
9 the one or more logical units; and
10 wherein the host processor does not determine which one or more logical units are
11 associated with the host processor.
12 ~~wherein the control processor is separate from the gateway device, the host~~
13 ~~processor, and the one or more storage units; and~~
14 ~~wherein the gateway device is separate from the control processor, the host~~
15 ~~processor, and the one or more storage units.~~

1 51. (Currently Amended) An apparatus as recited in Claim 50, wherein:
2 ~~the configuring steps~~ configuring the gateway device and configuring the one or more
3 storage units are performed by the control processor without modification to an
4 operating system of the host processor;
5 the gateway device is included in a virtual storage layer;
6 the host processor and the one or more storage units are included in a virtual server
7 farm;
8 ~~the control processor configures the gateway device to map the one or more logical~~
9 ~~units to a boot port of the host processor;~~
10 the control processor is coupled through one or more storage networks to a plurality of
11 storage gateways that includes the gateway device; and
12 the plurality of storage gateways are coupled through the storage networks to the one
13 or more storage units.

1 52. (Currently Amended) An apparatus as recited in Claim 50, wherein the control
2 processor is further configured to carry out the steps of:
3 causing the storage of first information that associates processors to logical units;
4 causing the storage of second information that associates logical units to storage units;
5 and
6 wherein the control processor being configured for associating the one or more logical
7 units from among the one or storage units to the host processor further
8 comprises configuring the control processor to carry out the step of mapping
9 the one or more logical units from among the one or more storage units to a
10 boot port of the host processor by reconfiguring the gateway device to logically
11 couple the one or more logical units to the boot port based on the stored first
12 information and the stored second information;
13 the control processor identifying one or more logical unit numbers (LUNs)
14 corresponding to the one or more logical units;
15 the control processor instructing the gateway device to map the one or more LUNs to
16 the small computer system interface (SCSI) port zero of the host processor
17 based on a unique processor identifier; and
18 the control processor instructing the one or more storage units to give the host
19 processor having the unique host identifier access to the one or more LUNs.

1 53. (Currently Amended) An apparatus as recited in Claim 50, wherein the request to
2 allocate storage to the host processor is a first request to allocate storage to the host
3 processor, and wherein the control processor is further configured to carry out the step
4 of:
5 generating the a second request to allocate storage to the host processor, based on the
6 first request;
7 wherein the control processor is communicatively coupled to a control database;
8 wherein the second request is directed from the control processor to a storage
9 manager; and

10 wherein the storage manager is communicatively coupled to the control processor, the
11 control database, and a storage network that includes the gateway device;
12 the control processor is further configured to carry out the step of causing the storage
13 manager to issue instructions to the one or more storage units to give the host
14 processor access to the one or more logical units.

1 54. (Cancelled)

1 55. (Currently Amended) An apparatus as recited in Claim 50, wherein the request to
2 allocate storage specifies a first amount of storage, and wherein the control processing
3 being configured for associating the one or more logical units further comprises
4 configuring the control processor to carry out the steps of:
5 the control processor identifying the one or more logical units (LUNs) of the one or
6 more storage units that, when combined, have a ~~sufficient~~ second amount of
7 storage ~~to satisfy that is at least as great as the first amount of storage specified~~
8 in the request [[:]].
9 ~~instructing the gateway device to map the identified LUNs to the small computer~~
10 ~~system interface (SCSI) port zero of the host processor based on a unique~~
11 ~~processor identifier; and~~
12 ~~instructing the one or more storage units to give the host processor having the unique~~
13 ~~host identifier access to the identified LUNs.~~

1 56. (Currently Amended) An apparatus as recited in Claim 50, wherein the request is a
2 first request, and configuring the control processor for associating the one or more
3 logical units further comprises configuring the control processor to carry out the steps
4 of:
5 issuing a second request to allocate one or more volumes on one of the one or more
6 storage units;
7 issuing a third request to make a concatenated volume using the one or more allocated
8 volumes;
9 causing the concatenated volume to be configured for use with the host processor;

10 issuing first instructions to the one or more storage units to bind the host processor to
11 the concatenated volume by giving the host processor access to the
12 concatenated volume;
13 issuing second instructions to the gateway device to bind the concatenated volume to
14 the host processor.

1 57. (Previously Presented) An apparatus as recited in Claim 56, wherein the control
2 processor is further configured to carry out the steps of:
3 determining that the second instructions have failed to bind the concatenated volume
4 to the host processor;
5 issuing third instructions to the one or more storage units to un-bind the host processor
6 from the concatenated volume;
7 determining that the first instructions have failed to bind the host processor to the
8 concatenated volume; and
9 issuing fourth instructions to the one or more storage units to break the concatenated
10 volume.

1 58. (Cancelled)

1 59. (Currently Amended) An apparatus as recited in Claim 50, wherein:
2 the one or more logical units associated with the host processor include at least a first
3 logical unit from a first volume of a first storage unit of the one or more
4 storage units and at least a second logical unit from a second volume of a
5 second storage unit of the one or more storage units;
6 the request to allocate storage specifies a parameter selected from the group consisting
7 of an amount of storage to be allocated and a type of storage to be allocated;
8 the control processor is separate from the gateway device, the host processor, and the
9 one or more storage units; and
10 the gateway device is separate from the control processor, the host processor, and the
11 one or more storage units.

1 60. (New) A method as recited in Claim 1, wherein the host processor does not know
2 which one or more logical units are associated with the host processor.

1 61. (New) A method as recited in Claim 1, wherein:
2 the one or more logical units are associated with one or more logical unit numbers
3 (LUNs); and
4 the host processor does not know the one or more LUNs for the one or more logical
5 units that are associated with the host processor.

1 62. (New) A method as recited in Claim 1, wherein:
2 the host processor is a first host processor;
3 the one or more logical units include a first logical unit and a second logical unit;
4 the one or more storage units include a first storage unit and a second storage unit;
5 the first logical unit is associated with the first storage unit;
6 the second logical unit is associated with the second storage unit;
7 the control processor associates the first logical unit and the second logical unit to the
8 first host processor at a first time; and
9 the method further comprises:
10 at a second time that is after the first time, the control processor associating the second
11 logical unit with a second host processor by:
12 the control processor configuring the gateway device to map the second logical
13 unit to the second host processor instead of the first host processor;
14 the control processor configuring the second storage unit to give the second
15 host processor access to the second logical unit instead of the first host
16 processor;
17 wherein the second host processor does not determine that the second logical
18 unit is associated with the second host processor;
19 wherein the first logical unit remains associated with the first host processor;
20 at a third time that is after the second time, the control processor associating the
21 second logical unit with the first host processor by:

22 the control processor configuring the gateway device to map the second logical
23 unit to the first host processor instead of the second host processor;
24 the control processor configuring the second storage unit to give the first host
25 processor access to the second logical unit instead of the second host
26 processor;
27 wherein the first host processor does not determine that the second logical unit
28 wherein the first host processor does not determine that the second
29 logical unit is associated with the first host processor; and
30 wherein the first logical unit remains associated with the first host processor.

1 63. (New) A computer-readable medium as recited in Claim 40, wherein the host
2 processor does not know which one or more logical units are associated with the host
3 processor.

1 64. (New) A computer-readable medium as recited in Claim 40, wherein:
2 the one or more logical units are associated with one or more logical unit numbers
3 (LUNs); and
4 the host processor does not know the one or more LUNs for the one or more logical
5 units that are associated with the host processor.

1 65. (New) A computer-readable medium as recited in Claim 40, wherein:
2 the host processor is a first host processor;
3 the one or more logical units include a first logical unit and a second logical unit;
4 the one or more storage units include a first storage unit and a second storage unit;
5 the first logical unit is associated with the first storage unit;
6 the second logical unit is associated with the second storage unit;
7 the control processor associates the first logical unit and the second logical unit to the
8 first host processor at a first time; and
9 the computer-readable medium further comprises one or more sequences of
10 instructions which, when executed by the control one or more processors,
11 cause the one or more processors to carry out the steps of:

12 at a second time that is after the first time, the control processor associating the second
13 logical unit with a second host processor by:
14 the control processor configuring the gateway device to map the second logical
15 unit to the second host processor instead of the first host processor;
16 the control processor configuring the second storage unit to give the second
17 host processor access to the second logical unit instead of the first host
18 processor;
19 wherein the second host processor does not determine that the second logical
20 unit is associated with the second host processor;
21 wherein the first logical unit remains associated with the first host processor;
22 at a third time that is after the second time, the control processor associating the
23 second logical unit with the first host processor by:
24 the control processor configuring the gateway device to map the second logical
25 unit to the first host processor instead of the second host processor;
26 the control processor configuring the second storage unit to give the first host
27 processor access to the second logical unit instead of the second host
28 processor;
29 wherein the first host processor does not determine that the second logical unit
30 wherein the first host processor does not determine that the second
31 logical unit is associated with the first host processor; and
32 wherein the first logical unit remains associated with the first host processor.

1 66. (New) An apparatus as recited in Claim 50, wherein the host processor does not know
2 which one or more logical units are associated with the host processor.

1 67. (New) An apparatus as recited in Claim 50, wherein:
2 the one or more logical units are associated with one or more logical unit numbers
3 (LUNs); and
4 the host processor does not know the one or more LUNs for the one or more logical
5 units that are associated with the host processor.

1 68. (New) An apparatus as recited in Claim 50, wherein:
2 the host processor is a first host processor;
3 the one or more logical units include a first logical unit and a second logical unit;
4 the one or more storage units include a first storage unit and a second storage unit;
5 the first logical unit is associated with the first storage unit;
6 the second logical unit is associated with the second storage unit;
7 the control processor associates the first logical unit and the second logical unit to the
8 first host processor at a first time; and
9 the control processor is further configured to carry out the steps of:
10 at a second time that is after the first time, associating the second logical unit with a
11 second host processor by:
12 configuring the gateway device to map the second logical unit to the second
13 host processor instead of the first host processor;
14 configuring the second storage unit to give the second host processor access to
15 the second logical unit instead of the first host processor;
16 wherein the second host processor does not determine that the second logical
17 unit is associated with the second host processor;
18 wherein the first logical unit remains associated with the first host processor;
19 at a third time that is after the second time, associating the second logical unit with the
20 first host processor by:
21 configuring the gateway device to map the second logical unit to the first host
22 processor instead of the second host processor;
23 configuring the second storage unit to give the first host processor access to the
24 second logical unit instead of the second host processor;
25 wherein the first host processor does not determine that the second logical unit
26 is associated with the first host processor; and
27 wherein the first logical unit remains associated with the first host processor.